Section 6. Electricity

Electricity Consumed by End-Use Sectors

Electricity prices are retail prices for sales to ultimate users. Prices are developed for the residential, commercial, industrial, and transportation sectors. In general, taxes are included in the prices. However, taxes collected by a utility from an end user and turned over to a government authority are generally not included in the revenues reported in the Energy Information Administration (EIA) *Electric Sales and Revenue* and *Electric Power Annual* or the Edison Electric Institute *Statistical Yearbook* and are not included in the prices. Taxes paid by the utility (rather than the end user) are considered operating costs and are passed on to the end user as part of the rate. Therefore, Federal, State, business, and property taxes are typically included in the prices, while sales and other point-of-purchase taxes usually are not.

Consumption is based on sales by electric utilities to ultimate users. Electricity consumption data by State for the residential, commercial, industrial, and transportation sectors are obtained from the EIA Combined State Energy Data System (CSEDS). Consumption of electricity in the industrial sector is adjusted for estimated refinery use in each State. (See the discussion in Section 7, "Consumption Adjustments for Calculating Expenditures," on page 417.)

Physical Unit Prices: 1987 Forward

For 1987 forward, physical unit prices for States are calculated for all four sectors as the average revenue per unit of sales by all electric utilities reporting sales to a State. Revenue and sales data from the *Electric Sales and Revenue* (1990 forward) and *Electric Power Annual* (1987 through 1989) are used to calculate physical unit prices. Data for the residential and industrial sectors are drawn from their respective columns. Data for the transportation sector are taken from the column titled "Other" that includes sales to railroads and railways. CSEDS consumption is used to determine the portion of the data in the column titled "Other" that is not sold to the transportation sector. These data are added to the column titled "Commercial" to arrive at the revenues and sales data for the commercial sector.

Physical Unit Prices: 1970 Through 1986

For 1970 through 1986, preliminary physical unit prices for States are calculated for all four sectors as the average revenue per unit of sales by all electric utilities reporting sales to a State. The calculation of physical prices is based upon the revenues and sales data from the *Statistical Yearbook* for each year in the series. Data for the residential sector and industrial sector are drawn from their respective columns. The commercial sector is the sum of the columns titled "Commercial," "Street and Highway Lighting," "Other Public Authorities," and "Interdepartmental." The transportation sector is the column titled "Railroads and Railways."

For 1980 through 1986, prices are based on preliminary revenues and sales data in the given year and are replaced with revised data in the following year. The only exception to this rule is the revenues data for AR in 1981; preliminary data are used in this case because of an apparent error in the revised data.

For 1970 through 1981, MD prices are assigned to DC. There are no other missing prices for the residential, commercial, and industrial sectors.

In the transportation sector, numerous price assignments are made due to the lack of sector-specific price data. Generally, electricity usage in the transportation sector is small; the sector's electricity use ranged from 0.1 percent to 0.2 percent of total U.S. electricity consumption in 1970 through 1986. From 1970 through 1986, only 15 States used measurable amounts of electricity in the transportation sector (CA, DC, FL, GA, IL, LA, MA, MD, NJ, NY, OH, PA, TN, VA, and WA). A few individual State prices are unavailable and are assigned the commercial sector prices: LA for 1970 through 1986 and TN for 1970 through 1986. (Prices are available for LA in 1970, 1972, 1973, but those prices are replaced by commercial sector prices to maintain a consistent series for the State.) In addition, MA transportation prices for 1985 and 1986 are estimated by multiplying the MA 1985 and 1986 commercial prices by the average of the ratios of the commercial-to-transportation sector prices for 1980 through 1984. Similarly, the VA 1977 transportation price is estimated by multiplying the VA commercial price in 1977 by the average of the ratios of the commercial-to-transportation sectors prices for 1978 through 1982.

In order to reconcile national-level electricity prices based on the *Statistical Yearbook* with the EIA national-level electricity prices published in the *Annual Energy Review (AER),* yearly adjustment factors are calculated for the residential, commercial, and industrial sectors as follows: a preliminary U.S. price for each sector is calculated as the average of the State prices, weighted by CSEDS consumption. These preliminary U.S. prices are divided by the national-level electricity prices published in the *AER*, and the quotient is used as an adjustment factor. The preliminary State prices are multiplied by the adjustment factor to produce the final physical unit State prices in those sectors. Since no transportation sector prices are published in the *AER*, no adjustments are made to that sector and the final physical unit prices are derived solely from the *Statistical Yearbook* sales and revenue data. The annual adjustment factors for the residential, commercial, and industrial sectors are shown in Table A48.

Btu Prices: All Years

Btu prices for States are calculated by dividing the physical unit prices by the conversion factor. U.S. Btu prices are calculated as the average of the State Btu prices, weighted by consumption data from CSEDS, adjusted for process fuel consumption in the industrial sector.

Table A48. Annual Electricity Price Adjustment Factors, 1970 Through 1986

Year	Residential	Commercial	Industrial
1970	1.05121	1.05712	1.06832
1971	1.05632	1.05926	1.05504
1972	1.05271	1.05514	1.05765
1973	1.06626	1.06188	1.05991
1974	1.09572	1.08098	1.08732
1975	1.09257	1.08098	1.08732
1976	1.07753	1.07755	1.06891
1977	1.06746	1.07675	1.06820
1978	1.06654	1.08273	1.06861
1979	1.06986	1.08349	1.06441
1980	1.04457	1.06109	1.06781
1981	1.05821	1.06943	1.06523
1982	1.06654	1.06351	1.05597
1983	1.05421	1.05301	1.05537
1984	0.99693	1.01924	0.99015
1985	1.00010	1.02008	0.98355
1986	0.99854	1.01518	0.98618

Source: EIA calculations based on data from the *Annual Energy Review* and the *Statistical Yearbook of the Electric Utility Industry.*

Data Sources

Prices

1991 forward: Energy Information Administration, Electric Utilities Database (Form EIA-861) available at http://www.eia.doe.gov/cneaf/electricity/page/data.html. Data are published in the EIA *Electric Sales and Revenue*: Residential Sector, Table 14; Commercial Sector, Tables 7 and 15; Industrial Sector, Table 16 ; and Transportation Sector, revenue data from Table 7 and sales data shown rounded in Table 6.

1990: Energy Information Administration, Revenue—*Electric Sales and Revenue 1990*, Table 7; Sales—*Electric Power Annual 1991*, Table 27.

1987–1989: Energy Information Administration, *Electric Power Annual 1988,* Tables 19 and 21 (1987 data); *Electric Power Annual,* Tables 27 and

29 (1988 and 1989). 1970-1986: Edison Electric Institute, *Statistical Yearbook of the Electric Utility Industry*, tables titled "Revenues: Total Electric Utility Industry" and "Energy Sales: Total Electric Utility Industry."

1970–1986: Energy Information Administration, *Annual Energy Review 1989*, Table 95, "Retail Prices of Electricity Sold by Electric Utilities, 1960–1989."

Consumption

1970 forward: Energy Information Administration, Combined State Energy Data System, electricity consumption by end-use sector.

Conversion Factor: All Years

3,412 Btu per kilowatthour

Nuclear Fuel for Generation of Electricity

Nuclear fuel prices are developed for the electric utility sector. State-level data on the amount of electricity generated from nuclear power plants are taken from CSEDS. Utilities operating nuclear plants report fuel costs per kilowatthour to the U.S. Department of Energy annually. These data are collected on a plant-by-plant basis and include all taxes, transportation, and handling costs paid by the utilities. The State where the nuclear power plant is located is assigned the reported nuclear fuel cost. For States with two or more nuclear power plants, the average fuel cost, weighted by generation, is attributed to the State.

Physical Unit and Btu Prices: All Years

State-level nuclear fuel prices are estimated in two steps: (1) the total cost of fuels consumed at all nuclear power plants in a State is divided by their total generation of electricity, and (2) the cost per output created in step 1 is divided by an annual U.S. average thermal conversion factor to create the price in dollars per million Btu. Occasionally, the fuel costs at nuclear power plants include small amounts of non-nuclear fuels that are necessary to continue essential plant operations during refueling or maintenance of the reactor.

A price is estimated by another method for States where generation and fuel cost data are not available for years in which the *State Energy Data Report (SEDR)* shows nuclear electric power generation. The ratio of the change in the national nuclear fuel price is used to estimate nuclear fuel prices for missing years within a State. The ratio of national prices used in the estimation is the ratio before missing prices are assigned. The States and years for which nuclear prices are estimated are shown in Table A49.

Nuclear electricity generation levels are negative for CO in 1985, TN in 1986 and 1987, OR in 1993 and CT in 1997, indicating that the nuclear power plants used more energy than they supplied. In these cases, the fuel prices and expenditures are set to zero. In 1986, there is generation in CO but price data are not available. The price for CO in 1986 is estimated by using the ratio of the 1984-to-1986 U.S. average prices and applying that ratio to the 1984 CO price.

For MO in 1985, a large credit resulting from litigation is assigned to fuel costs, creating an artificially low price. The 1986 MO uranium

Table A49. Nuclear Electricity Fuel Price Estimates, 1970 Through 1989

State	Years
Alabama	1973, 1974, 1976
Arizona	1985
Arkansas	1980
Colorado	1977, 1978, 1982–1984, 1986–1989
Georgia	1974
Maine	1972
Mississippi	1984
Missouri	1984, 1985
North Carolina	1982
Ohio	1986
Oregon	1975
South Carolina	1970, 1985
Tennessee	1980
Wisconsin	1970

price, which is in the range of the prices of other nuclear fuel plants, is used to estimate the 1985 price by applying the ratio of the 1986-to-1985 national prices.

The 1985 *Historical Plant Costs and Annual Production Expenses for Selected Electric Plants* has a footnote for the Duke Power Catawba plant in SC stating that the reported production expenses represent only 12.5 percent of the actual production expenses. The production expenses used in the calculation for the Catawba plant are adjusted accordingly.

Prices for GA in 1978, NC in 1982, and OH in 1986 are assigned because the prices calculated by using reported data are significantly different from prices for other years for these States.

There are no prices available for WA in 1970 through 1987 and national prices are assigned for those years.

Data Sources

Prices

1992 forward: Prices are developed by the Energy Information Administration, Office of Coal, Nuclear, and Alternate Fuels, from data compiled by the Utility Data Institute/McGraw-Hill. The data are collected on Federal Energy Regulatory Commission, FERC Form 1, "Annual Report of Major Electric Utilities, Licensees, and Others," and Energy Information Administration, Form EIA-412, "Annual Report of Public Electric Utilities."

1988–1991: Energy Information Administration, Electric Plant Cost and Power Production Expenses, Table 16 (1988–1990) and Table 14 (1991).

1982–1987: Energy Information Administration, *Historical Plant Costs and Annual Production Expenses for Selected Electric Plants*, Table 18 (1982-1984) and Table 20 (1985–1987).

1979–1981: Energy Information Administration, *Thermal Electric Plant Construction Cost and Annual Production Expenses*, pages 267–279 (1979), Table 11 (1980 and 1981).

1975–1978: Energy Information Administration, *Steam Electric Plant Construction Cost and Annual Production Expenses*, "Section II-Nuclear Plants."

1970–1974: Federal Power Commission, *Steam Electric Plant Construction Costs and Annual Production Expenses*, data sheets for Nuclear Plants (1970–1973), and "Section II-Nuclear Plants" (1974).

Consumption

1970 forward: Energy Information Administration, Combined State Energy Data System, electricity generated by nuclear power.

Conversion Factors

1970 forward: Energy Information Administration, *State Energy Data Report 1997, Consumption Estimates,* Table C1, as shown in Table A50.

Table A50. Nuclear Steam-Electric Thermal Conversion Factors
(Thousand Btu per Kilowatthour)

Year	Conversion Factor	Year	Conversion Factor
1970	10.977	1984	10.843
1971	10.837	1985	10.813
1972	10.792	1986	10.799
1973	10.903	1987	10.776
1974	11.161	1988	10.743
1975	11.013	1989	10.724
1976	11.047	1990	10.680
1977	10.769	1991	10.740
1978	10.941	1992	10.678
1979	10.879	1993	10.682
1980	10.908	1994	10.676
1981	11.030	1995	10.658
1982	11.073	1996	10.623
1983	10.905	1997	10.623